



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/966,923	09/28/2001	Zhijian Lu	01 P 14628 US (8055-108)	5067

7590 10/14/2003

Infineon Technologies North America Corp.
c/o Siemens Corporation
Intellectual Property Department
186 Wood Avenue South
Iselin, NJ 08830

EXAMINER

SODERQUIST, ARLEN

ART UNIT	PAPER NUMBER
----------	--------------

1743

DATE MAILED: 10/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/966,923

Applicant(s)

LU ET AL.

Examiner

Arlen Soderquist

Art Unit

1743

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett (us 4,675,072) in view of Agarwal (US 6,323,046). In the patent Bennett teaches detection of a trench etch endpoint by laser induced fluorescence. Laser induced fluorescence (LIF) is utilized to detect and control the reactive ion etch-through of a given layer in a wafer by detecting a large change in the concentration of a selected minor species from the wafer in the etching plasma. As an example, CuCl generated from Cu dopant can be monitored in the plasma by LIF detection of its particular laser transition line. An electrical signal is indicative of the CuCl concentration in the plasma, and when the amplitude of this signal falls below a predetermined level, the given layer of the wafer, present in a reaction chamber, is considered to be etched through and the process is halted. Example 3 detects the presence of aluminum from studs that are set in the silicon dioxide layer. Bennett does not teach an implanted layer for endpoint detection of the use of a mass spectrometer.

In the patent Agarwal teaches method and apparatus for endpointing a chemical-mechanical planarization process. A method and apparatus for endpointing a planarization process of a microelectronic substrate. In one embodiment, the apparatus may include a species analyzer that receives a slurry resulting from the planarization process and analyzes the slurry to determine the presence of an endpointing material implanted beneath the surface of the microelectronic substrate. The species analyzer may include a mass spectrometer or a spectrum

analyzer. In another embodiment, the apparatus may include a radiation source that directs impinging radiation toward the microelectronic substrate, exciting atoms of the substrate, which in turn produce an emitted radiation. A radiation detector is positioned proximate to the substrate to receive the emitted radiation and determine the endpoint by determining the intensity of the radiation emitted by the endpointing material. The endpointing material may be selected to be easily detected by the species detector or the radiation detector, and may further be selected to be easily distinguishable from a matrix material that comprises the bulk of the microelectronic substrate. The mass spectrometer is discussed on column 5, lines 21-45 and the spectrum analyzer is discussed of lines 46-60 of the same column. Column 6 lines 31-37, the endpointing material is taught as tungsten, aluminum, copper, or any material that can be distinguished from the matrix material which may be any non-silicon compound or element when the matrix material includes any silicon compound.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the mass spectrometer of Agarwal for the detection device of Bennett because of the teaching of equivalence by Agarwal in detecting the end point detecting material. It would also have been obvious to one of ordinary skill in the art to implant the end point detecting material in the matrix material as taught by Agarwal because of the ability to set the depth of material that is removed.

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additionally cited art relates to end point detection techniques used in the semiconductor processing industry.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arlen Soderquist whose telephone number is (703) 308-3989. The examiner's schedule is variable between the hours of about 5:30 AM to about 5:00 PM on Monday through Thursday and alternate Fridays.

For communication by fax to the organization where this application or proceeding is assigned, (703) 305-7719 may be used for official, unofficial or draft papers. When using this number a call to alert the examiner would be appreciated. Numbers for faxing official papers are 703-872-9310 (before finals), 703-872-9311 (after-final), 703-305-7718, 703-305-5408 and 703-305-5433. The above fax numbers will generally allow the papers to be forwarded to the examiner in a timely manner.

Art Unit: 1743

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

A handwritten signature in black ink, appearing to read "Arlen Soderquist". The signature is fluid and cursive, with a large, stylized "S" at the end.

October 1, 2003

ARLEN SODERQUIST
PRIMARY EXAMINER